

Abstract Submitted
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Compact toroid injection into C-2U THOMAS ROCHE, H. GOTA, E. GARATE, Tri Alpha Energy, Inc., T. ASAI, T. MATSUMOTO, J. SEKIGUCHI, Nihon University, S. PUTVINSKI, I. ALLFREY, M. BEALL, M. CORDERO, E. GRANSTEDT, J. KINLEY, M. MOREHOUSE, D. SHEFTMAN, T. VALENTINE, W. WAGGONER, Tri Alpha Energy, Inc., AND THE TAE TEAM — Sustainment of an advanced neutral beam-driven FRC for a period in excess of 5 ms is the primary goal of the C-2U [1] machine at Tri Alpha Energy. In addition, a criteria for long-term global sustainment of any magnetically confined fusion reactor is particle refueling. To this end, a magnetized coaxial plasma-gun has been developed [2]. Compact toroids (CT) are to be injected perpendicular to the axial magnetic field of C-2U. To simulate this environment, an experimental test-stand has been constructed. A transverse magnetic field of $B \approx 1kG$ is established (comparable to the C-2U axial field) and CTs are fired across it. As a minimal requirement, the CT must have energy density greater than that of the magnetic field it is to penetrate, i.e., $\frac{1}{2}\rho v^2 \geq B^2/2\mu_0$. This criteria is easily met and indeed the CTs traverse the test-stand field. A preliminary experiment on C-2U shows the CT also capable of penetrating into FRC plasmas and refueling is observed resulting in a 20 – 30% increase in total particle number per single-pulsed CT injection. Results from test-stand and C-2U experiments will be presented.

[1] M. Binderbauer et al., Physics of Plasmas, 22, 056110 (2015)

[2] T. Matsumoto et al., Bull. Am. Phys. Soc. 59, UP8.00008 (2014)

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